PROCEEDINGS OF THE UNITED STATES NATIONAL MUSEUM

issued by the

SMITHSONIAN INSTITUTION
U. S. NATIONAL MUSEUM

Vol. 99 Washington: 1949 No. 3244

NINE NEW XYSTODESMID MILLIPEDS FROM VIRGINIA AND WEST VIRGINIA, WITH RECORDS OF ESTABLISHED SPECIES

By Richard L. Hoffman

The millipeds reported herein were accumulated largely through field work by the author and by Dr. Horton H. Hobbs, Jr., during the summer of 1947. Five of the species listed were collected near the author's home, in Alleghany County, Va., and four species are due to Dr. Hobbs' field work at Mountain Lake, Va., and in southern West Virginia. The others, with a few exceptions, were obtained on a trip through southwestern Virginia in June and July by Hubert I. Kleinpeter and the author. Lloyd G. Carr sent a number of specimens from Augusta County, and Charles M. Wilson and Miss Margaret Walton have contributed a large amount of material from Mountain Lake. Individual specimens have been donated by Dr. L. R. Cleveland, Lewis Wright, and Miss Mary Timberlake.

Of the 16 species here listed, 9 are described as new. In addition, records of the occurrence of established species are given, wherever the collections were able to provide new distributional stations. In connection with previously described forms, it seemed pertinent to add a citation to the original description as well as to mention the type locality. A brief diagnosis is supplied for each genus—in some cases quoted from the original generic description.

In previous descriptions of xystodesmids there has been no uniformity about the aspects from which the male gonopods have been drawn. I believe that comparisons of species would be facilitated greatly if

the figures were made with some deference to uniformity of position. The drawings that accompany the following descriptions were made to show the configuration of the left gonopod and were made from direct cephalic and lateral or mesial aspects after the appendage had been removed and oriented properly.

I take pleasure in acknowledging my indebtedness to H. F. Loomis for examining specimens and supplying information, to Lawrence M. Carter for assistance with the drawings, and to Dr. Hobbs for many courtesies attendant upon the work as well as for many collections.

Family XYSTODESMIDAE Cook

Xystodesmidae Cook, Ann. New York Acad. Sci., vol. 11, p. 5, 1895. (Type genus: *Xystodesmus* Cook.)

Genus APHELORIA Chamberlin

Apheloria Chamberlin, Can. Ent., vol. 53, p. 232, 1921. (Genotype: *Fontaria montana* Bollman.)

Telopodite of male gonopod a simple coiled blade, with a small curved basal spine.

APHELORIA ADELA Chamberlin

Apheloria adela Chamberlin, Bull. Univ. Utah, vol. 30, No. 2, p. 10, fig. 34, 1939 (Ithaca, N. Y.).

Virginia: *Grayson County:* Mount Rogers, east side near top, 1 male, RLH No. 7–147–2b; *Tazewell County:* Burkes Garden, 1 male, RLH No. 6–3047–1b.

These records constitute a very considerable extension in the known range of *adela*, which heretofore has been reported only from Ithaca, N. Y. Doubtless it ranges southward in the Appalachians and will be found in West Virginia, Maryland, and Pennsylvania.

It is not impossible that future studies may show *adela* to be a synonym of *A. coriacea*, but for the time being it seems possible to distinguish the former on minor differences in the gonopods and pattern.

APHELORIA ANTROSTOMICOLA, new species

Plate 26, Figures 1, 2

Diagnosis.—Telopodite of male gonopod strongly recurved, forming slightly more than a complete circle, bent mesiad with distal end directed cephalically; color black, with yellow keels and large crescent-shaped orange spots on the posterior margins of the tergites.

Description.—A medium-sized species. Length of holotype, 38, width, 8.8 mm.; length of allotype, 40, width, 8.5 mm. Width of body averages 22 percent of length. Segments between fourth and

fifteenth of full width. Keels broad, continuing slope of dorsum, usually slightly separated. Anterior corners of keels rounded; posterior corners through twelfth segment forming right angles, thereafter becoming increasingly produced caudally. Most keels with anterior corners lobed cephalad. Dorsolateral edges of keels produced into ridges, most conspicuously so on posterior segments; repugnatorial pores dorsal in position, near middle of keel.

Collum with posterior margin relatively straight in both sexes.

Anal segment truncate distally and bearing a small terminal tuft of setae, triangular in dorsal aspect, slightly longer than broad, its base wider than the distance between keels of penultimate segment. Anal valves slightly inflated, glabrous, their mesial edges produced into ridges, a tiny tubercule on each valve near the center of the mesial margin, no other sculpturing. Preanal scale triangular, as broad as long, somewhat rounded distally, with three terminal lobes of which the median lobe is conspicuously larger than the other two, in this respect differing from most other species.

Bases of the last pair of legs almost in contact mesially. Sternites and coxae unarmed, femora with long spines; legs hirsute, terminating in heavy curved claws. Coxae of the second pair of legs of the male with the usual rounded knobs, which are truncate and flat distally.

Gonopods typical of the genus in consisting of a somewhat enlarged basal portion and a rounded, loosely coiled telopodite blade, which in this species makes somewhat more than a complete circle and is bent mesiad and then distad, as shown in the drawings. Basal spine rather small and slightly curved, arising from a cephalolateral shoulder. Mesial side of base with a rounded setiferous shoulder.

In life, dorsum black with caudolateral two-thirds of keels bright yellow. A central row of large crescentic reddish-orange blotches on posterior margins of the tergites; in males these blotches are usually separated from the yellow keels but in females tend to be in contact—in which case the demarcation between the colors is a sharp one. Head light brown, margins of labrum and antennae light brown, sides of head and antennal sockets yellowish. Each article of antennae white distally. Sides of body a burnished yellow, legs light yellow, sternites tan. Anal valves yellowish, usually with a central brown mark.

Type specimens.—Holotype and female allotype in the U. S. National Museum, No. 1802. Additional male and female topoparatypes in my personal collection, No. 6–1647–1b.

Type locality.—Sinkhole at entrance to Stull's Cave, on property of C. R. Stull, 8 miles southwest of Lowmoor, Alleghany County, Va., on County Route 608. Seven specimens were collected during

the course of about 10 minutes in the leaf mold accumulated in the bottom and on the sides. No specimens were found in the adjacent woods.

Remarks.—As far as color pattern goes, this species is like *A. virginia* Chamberlin from Pittsylvania County, Va., and the new species described in this paper as *A. picta* from Mountain Lake, Va. However, according to the description, *virginia* has the keels orange and the median spots yellow, a reversal of the pattern in the other two species. The median spots of *antrostomicola* tend to merge into the yellow of the keels, whereas in none of my specimens of *picta* does this condition obtain. Besides, the gonopod of *antrostomicola*, although similar to that of *picta*, presents several differences.

The specific name of this species refers to the habitat in which the types and only known specimens were collected.

APHELORIA ASPILA Chamberlin

Apheloria aspila CHAMBERLIN, Bull. Univ. Utah, vol. 30, No. 2, p. 10, fig. 33, 1939 (Soco Falls, N. C.).

VIRGINIA: *Grayson County*: Mount Rogers, east side near top, RLH No. 6–3047–2b (one male).

Previously known only from the type locality, which is near Waynesville, Haywood County, N. C. This new record extends the range northward in the southern Blue Ridge to the Balsam Mountains. *A. aspila*, like *Boraria carolina*, which is also known only from Soco Gap and Mount Rogers, may be found to be widespread in western North Carolina.

APHELORIA CORIACEA (Koch)

Fontaria coriacea KOCH, System der Myriapoden, p. 141, 1847 ("Pennsylvania").

VIRGINIA: *Albemarle County:* Stony Point, RLH No. 10–3047–1e (1 male); *Alleghany County:* 2 miles northwest of Clifton Forge, RLH No. 6–1447–1a (3 males, 4 females); *Augusta County:* Sherando Lake, near Lyndhurst, RLH No. 8–1547–1b (many males and females collected by Carr); *Roanoke County:* Roanoke, RLH No. 7–547–1 (1 male collected by Wright).

The occurrence of this form at Clifton Forge is interesting. It is common at and around a large, deserted sawmill, but only once in many years' acquaintance with the region have I seen a specimen in a different place. This exceptional creature was across a small ridge from the sawmill and no more than a thousand yards away from it.

At Roanoke, where I have seen fragments of this form, it seemed to be common, of all places, in pine woods on a dry shale monadnock. Bleached specimens could be found under rocks and logs, and Mr. Wright (who later secured a living specimen nearby) informed me

that in wet weather he had seen the millipeds crawling about in the pine stands.

The locality at which Mr. Carr obtained a large series of specimens is at the base of the Blue Ridge, in a moist hardwood forest with many ponds and marshes.

All the specimens listed above are very large, some attaining a length of 45 mm. The keels are bright reddish pink, and the posterior margins of the keel are marked by broad yellow bands. Mr. Loomis, upon examination of a specimen, suggested that Koch's name be used for my material, an allocation with which I gladly concur. The male gonopods of the specimens are identical with those of many large, cross-banded Aphelorias from Ohio, West Virginia, and Pennsylvania. The status of the banded Aphelorias is confused, and some hesitation attends my identification of some of the Virginia material. A thorough revision of the genus, based on adequate series of specimens, is much to be desired.

APHELORIA KLEINPETERI, new species

PLATE 26, FIGURES 3, 4

Diagnosis.—A medium-sized species characterized by the color pattern of black dorsum and red keels and by the structure of the male gonopods, the telopodite of which is expanded distally into a spatulate portion suggesting that of *Sigiria.*

Description.—Length of holotype, 37, width, 7.2 mm., length of allotype, 39.1, width, 8.1 mm. Width of body averages 20 percent of length. Segments between fourth and fifteenth of full width. Keels moderately broad, not overlapping. Anterior corners lobed, rounded; posterior corners through twelfth segment approximately right-angled, becoming caudally produced on the posterior third of body. Keels of segment 18 almost enclosing those of 19. All keels with dorsolateral edges raised, particularly so on last 10 segments; repugnatorial pores on dorsal side of swellings.

Collum crescentic in shape, as long as the next two segments combined, its posterior edge with a median emargination, ventrolateral extremities directed slightly caudoventrad.

Anal segment triangular in dorsal aspect, longer than broad, base slightly wider than distance between keels of penultimate segment; end truncate, bearing a few setae. Anal valves slightly inflated, glabrous, their mesial edges produced into ridges each of which bears a single setiferous papilla. Each valve with a small knob near the center, otherwise unsculptured. Preanal scale very broadly triangular, rounded, with one terminal and two smaller lateral lobes.

Bases of last pair of legs almost in contact mesially. No coxal or sternal armature. Trochanter and femur with large spines. Femora

practically glabrous, trochanters and terminal podomeres very hirsute. Terminal claw curved, strong. Male with coxae of second pair of legs bearing the usual knobs, these rounded distally.

Gonopod with the loosely coiled blade and basal spine characteristic of *Apheloria*; distinct in the large subterminal expansion of telopodite, with a small distal acumen. Blade of telopodite bent slightly mesiad. *In situ*, blades lie against each other and directed at right angles to the longitudinal axis of the body. In mesial aspect, a further distinction can be seen in the deep sinus on the base of the telopodite just behind the setiferous shoulder. Basal spine medium in size, borne on a small cephalolateral shoulder.

In life, dorsum very dark brown or black, with outer and cephalic margins of collum, caudolateral halves of keels, and tip of anal segment bright red. Underparts yellowish tan, legs becoming lighter distally, claws brown. Head dark brown above, margins of labrum light yellowish brown. Antennal sockets and first three articles yellow, becoming darker distally.

Type specimens.—Holotype and female allotype in the U. S. National Museum, No. 1803. Two male paratypes in my personal collection, No. 6–3047–1c. The allotype was collected by J. E. Graf on June 5, 1940, the others were taken on June 29–30, 1947, by Kleinpeter and me.

Type locality.—Burkes Garden, Tazewell County, Va. The tops of the surrounding mountains belong to the Canadian Zone. A specimen (the type) was taken at 4,600 feet on Beartown Mountain, in a very wet forest of maple-spruce-redbud association, with mesophytic herbs such as *Impatiens pallida.* The paratypes were found in Mill Gap, at 2,900 feet, in a hemlock-laurel association. The allotype was collected on Clinch Mountain (eastern rim of Burkes Garden) at 4,300 feet.

A. kleinpeteri shows no close relationships with any other known member of the genus. The gonopods represent, perhaps, a further development of the *picta* type; but the red and black coloration is unique for the genus.

I take pleasure in naming this handsome species for my good friend and tireless field companion, Hubert I. Kleinpeter, who secured the holotype as well as many other diplopods during our investigations.

APHELORIA PICTA, new species

PLATE 26, FIGURES 5, 6

Diagnosis.—A medium-sized species, characterized by the color pattern of yellow keels and large reddish median blotches, and by the gonopod of the male, which is very much recurved, slender, and bent mesiad and distad, with a conspicious subterminal "heel."

Description.—Length of holotype, 41, width, 9.4 mm.; length of allotype, 39, width, 9 mm. Width of body averages 23 percent of length. Sides of body subparallel, segments 4 through 15 of full width. Keels moderately broad, continuing slope of dorsum, usually well separated. Anterior corners of keels rounded, posterior corners also somewhat rounded, not as sharply angular as in other species. Keels of segment 15 not produced caudally, those of 16 noticeably produced. Dorsolateral edges of keels raised into ridges; repugnatorial pores situated dorsally, at about middle of keel.

Collum with both cephalolateral and caudolateral margins tapering distally.

Anal segment triangular in dorsal aspect, longer than broad, its basal width approximately equal to distance bewteen keels of the penultimate segment; truncate distally, bearing a few scattered tufts of setae. Anal valves slightly inflated, bearing a few scattered setae, their mesial margins raised into ridges each of which bears a single seta. Preanal scale triangular, somewhat longer than broad, with three terminal lobes of which the median one is conspicuously larger than the other two—in this respect agreeing with *A. antrostomicola.*

Bases of last pair of legs very slightly separated. Sternites and coxae unspined. Trochanters and femora spined. Legs terminating in a strong curved claw, with many stiff bristles around its base. Coxae of second pair of legs of males with the usual cylindrical knobs which in this species are flattened distally almost to the extent found in *antrostomicola.*

Gonopods resembling those of *antrostomicola* in being almost cylindrical and narrowly tapering, not flattened or bladelike and in being bent mesiad and distad in more than a complete circle; differing from *antrostomicola* in the curves of the telopodite being rather angular with straight interspaces and in the subterminal "heel," which gives the distal third of the appendage the appearance of an Oriental slipper. Base of telopodite with a mesial setiferous shoulder and a cephalolateral should which bears the basal spine.

Dorsum black, with caudolateral half of keels, tip of anal segment, and legs yellow. A large, reddish-orange crescentic blotch on posteromedian margin of each tergite. Collum with distal ends of dorsal surface yellow, and a dorsomedian hourglass-shaped marking of orange. Front of head black, margin of labrum brown. Antennae light brown, distal portions of the articles not white. Sternites posterior to gonopods tan (except last), sides of body brownish tan, anal valves brown.

Type specimens.—Holotype and female allotype in the U. S. National Museum, No. 1804. Additional male and female topoparatypes are in my personal collection, Nos. 6–2647–1, 7–247–1b. All specimens collected by Hobbs, Wilson, and Walton.

Type locality.—Mountain Lake, Giles County, Va. Most specimens collected near the University of Virginia Biological Station, with predominating forest cover of deciduous trees such as oak, maple, and yellow poplar. The undergrowth is largely of ericaceous shrubs. Mountain Lake is located on the top of Salt Pond Mountain, in central Giles County, at an elevation of about 3,800 feet.

Remarks.—This species has its closest affinities with *Apheloria antrostomicola*, from which it may be only subspecifically distinct. The similarities in pattern, gonopods, preanal scale, and coxal lobes all suggest such an association. The type localities for the two species are less than 40 miles apart and are in the same mountain range. Collecting in the intervening region will prove interesting, as it is not yet known whether *antrostomicola* occurs in humus away from limestone regions.

APHELORIA TRIMACULATA (Wood)

Polydesmus (*Fontaria*) *trimaculata* Wood, Proc. Acad. Nat. Sci. Philadelphia, vol. 6, p. 6, 1864 (Susquehanna County, Pa.).

Virginia: *Alleghany County:* McGraws Gap, 3 miles northwest of Clifton Forge, RHL Nos. 3–3047–3b, 5–1847–1b, 6–147–1b, 6–1447–1b, and 6–2147–1; *Augusta County:* Sherando Lake, near Lyndhurst, RHL No. 8–1547–1c (male and 2 females collected by Carr); Elliotts Knob, 10 miles west of Staunton (1 dead female seen in August 1947); *Bath County*: Douthat State Park, female seen June 15, 1947.

A. trimaculata has also been reported from Mountain Lake, Va., by Loomis (Psyche, vol. 51, p. 175, 1944). The accuracy of the locality data, however, is not beyond suspicion, inasmuch as a summer of very thorough collecting at Mountain Lake has not revealed any xystodesmids that might be considered *trimaculata.*

The specimens listed above are all rather large, exceeding previously published measurements. Since Wood's figure of the gonopod of *trimaculata* is not very useful for comparison with specimens, it seems advisable to relegate this large southern form tentatively to *trimaculata* until topotypic material can be examined.

A. trimaculata is a very common form near Clifton Forge, and on damp or rainy days one can observe many specimens out wandering around. At other times no special effort is needed to dig specimens out of the leaf mold. They are often seen on hemlock logs, but I have yet to find one inside a log. Large numbers of unpigmented young of this species are found during the spring months, becoming scarce later in the year, and specimens almost mature are very rarely seen. The change from seventh instar larvae to adults takes place during August. Mating occurs throughout the summer, from early in June through August.

Genus BORARIA Chamberlin

Boraria CHAMBERLIN, Proc. Biol. Soc. Washington, vol. 56, p. 143, 1943. (Genotype: *Aporiaria carolina* Chamberlin.)

Gonopod of male a relatively straight cylindrical process, abruptly tapering distally into a slender acumen, mesial side of telopodite with a slender distally directed spine.

BORARIA CAROLINA (Chamberlin)

Aporiaria carolina CHAMBERLIN, Bull. Univ. Utah, vol. 30, No. 2, p. 6, fig. 10, 1939 (Soco Falls, N. C.).

VIRGINIA: *Grayson County*: Mount Rogers, east side near top, RLH No. 7–147–1a (2 males).

As this species was originally described from Soco Gap Falls, near Waynesville, Haywood County, N. C., its discovery on Mount Rogers extends the known range considerably to the north, and suggests that the species will be found at intervening places. Both of the specimens at hand match Chamberlin's description and drawing perfectly.

Genus BRACHORIA Chamberlin

Brachoria CHAMBERLIN, Bull. Univ. Utah, vol. 30, No. 2, p. 3, 1939. (Genotype: *B. initialis* Chamberlin.)

Broad short species with posterior corners of keels of segments 1 through 12 rounded instead of angular; blade of telopodite of male gonopod with one or two joints, basal spine on the lateral side, not rising from a conspicious shoulder.

BRACHORIA ETHOTELA (Chamberlin)

Brachoria ethotela CHAMBERLIN, Bull. Univ. Utah, vol. 32, No. 8, p. 5, 1942 (Marion, Va.)

VIRGINIA: *Tazewell County:* Burkes Garden, RLH No. 6–2947–2c (male and female).

This species was described from specimens taken at Marion, in Smyth County; thus the new material constitutes but a small extension of the range. The Burkes Garden specimens were found on Beartown Mountain at an elevation of about 4,600 feet in wet deciduous woods.

Genus DELTOTARIA Causey

Deltotaria CAUSEY, Ent. News, vol. 53, p. 165, 1942. (Genotype: *Deltotaria brimleii* Causey.)

"This genus resembles *Apheloria* in the curvature and the length of the principal blade of the telopodite of the male gonopods, but differs in having a thin subterminal process on the blade. It differs from other genera of this family in that the gonopods bear a large

medial pointed coxal peg in addition to the characteristic sickle-like coxal spine." (Causey, *op. cit.*)

DELTOTARIA CORONATA, new species

PLATE 26, FIGURES 7, 8

Diagnosis.—Distinguished by the presence of three terminal processes on the telopodite blade and by the color pattern of black on the back, with the keels and anterior margin of collum bright yellow.

Description.—A somewhat longer and narrower form than the genotype. Length of holotype, 36, width, 8 mm.; length of allotype, 37.5, width, 8 mm. Width of body averages 21.5 percent of length.[1] Keels of the anterior and midbody segments with the corners rounded somewhat, those of the posterior segments with the posterior corners produced caudally. Keels of the penultimate segment small, not enclosing anal segment or enclosed by those of the antepenultimate segment. Dorsolateral edges of all keels slightly raised into ridges. Repugnatorial pores dorsal in position, about at midline of keel.

Collum slightly longer than succeeding segment, posterior margin rather straight in males, but tapering cephalad toward the ends in females.

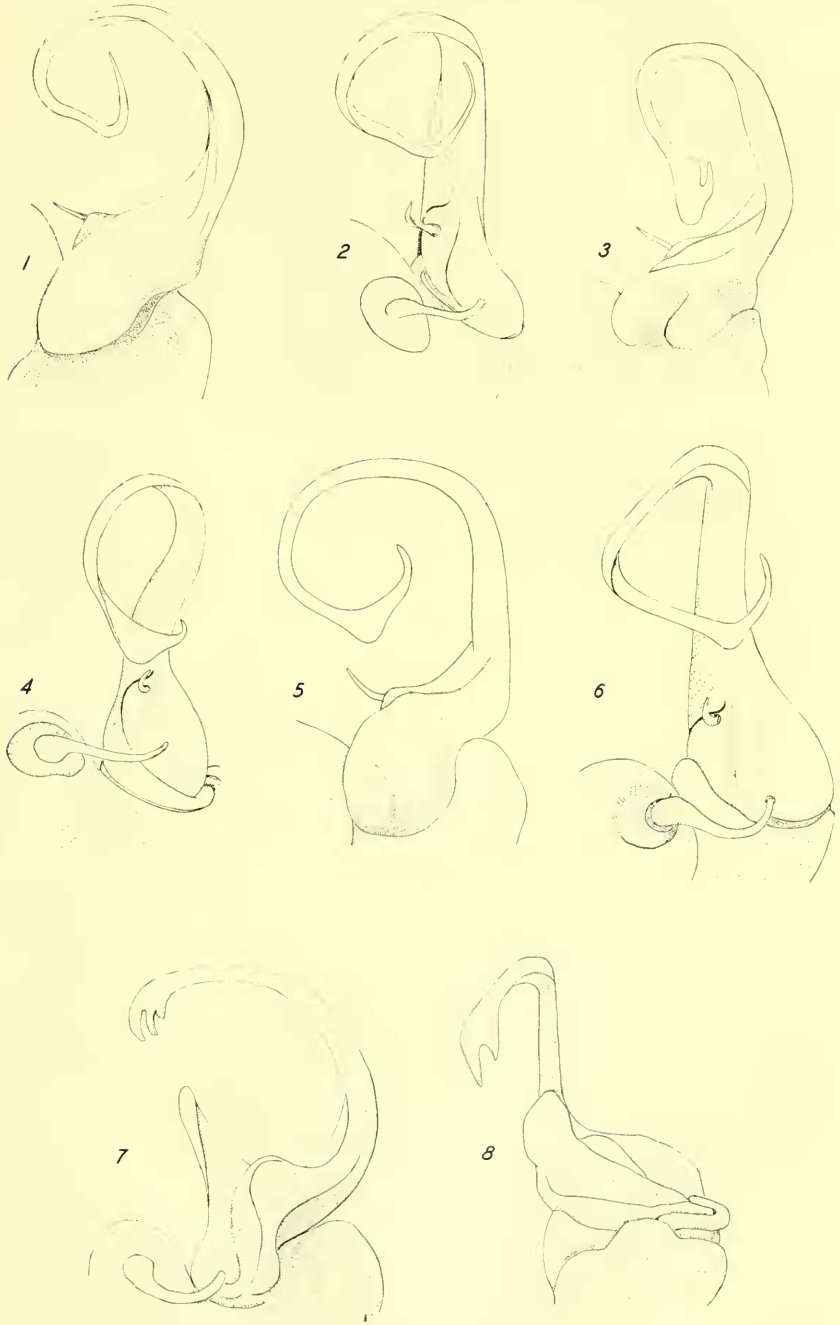
Anal segment triangular in dorsal aspect, longer than broad, the tip truncate and bearing a few setae. Anal valves glabrous, with the mesial margin of each produced into a ridge, not otherwise sculptured. Preanal scale broadly triangular, wider than long, with a median and two lateral lobes.

Bases of last pair of legs in contact mesially. Sternites very weakly spined, trochanters and femora strongly spined; legs with strong terminal claws. Coxae of second pair of legs of males with prominent rounded knobs.

Gonopods of male relatively large and prominent. *In situ* the main axis of the telopodite blade lies at a right angle to that of the body, the gonopods at rest having the blades in contact and frequently hooked together. The gonopod resembles that of *D. brimleii* as figured by Causey (*op cit.*, fig. 1) in general appearance but differs in having three terminal teeth on the telopodite, as well as a prominent knob between the coxal projection and base of the blade. Coxal projection large.

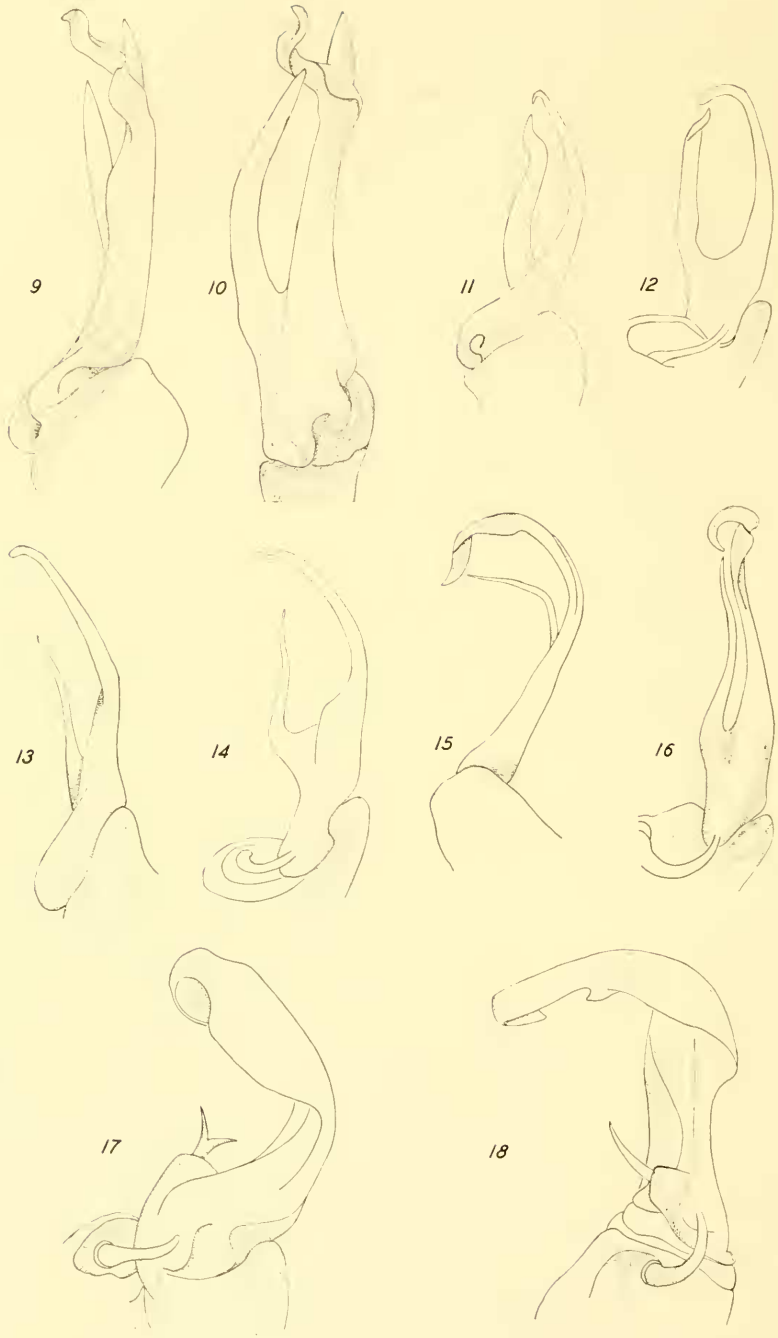
Dorsum glossy brownish black, with caudolateral two-thirds of keels, anterior margin of collum, and tip of anal segment lemon-yellow. Underparts yellowish tan. Head dark brown, except margin of labrum which is light brown; antennae light brown with distal portion of each article white. Claws of legs brown, sternites of a

[1] 27.5 percent in *brimleii*, according to Causey's measurements. This is probably due to the dried and doubtless telescoped condition of the types.



GONOPODS OF NEW SPECIES OF APHELORIA AND DELTOTARIA

1, 2, *Apheloria antrostomicola* (1, mesial view; 2, cephalic view); 3, 4, *A. kleinpeteri* (3, mesial view; 4, cephalic view); 5, 6, *A. picta* (5, mesial view; 6, cephalic view); 7, 8, *Deltotaria coronata* (7, mesial view; 8, cephalic view). [Setae have been omitted to show basal structure more plainly.]



GONOPODS OF NEW SPECIES OF NANNARIA AND SIGMORIA

9, 10, *Nannaria ericacea* (9, lateral view; 10, cephalic view); 11, 12, *N. laminata* (11, lateral view; 12, cephalic view); 13, 14, *N. simplex* (13, lateral view; 14, cephalic view) 15, 16, *N. wilsoni* (15, lateral view; 16, cephalic view); 17, 18, *Sigmoria furcifera* (17, mesial view; 18, cephalic view). [Setae have been omitted to show basal structure more plainly.]

darker shade than legs. A faint dark spot in the yellow of the keels just above each repugnatorial pore.

Type specimens.—Holotype, female allotype, and a male paratype in the U. S. National Museum, No. 1805; additional paratypes are retained in my personal collection, Nos. 6–3047–2a, 7–147–1b, and 7–147–2a. Most of the above specimens were collected on June 30–July 1, 1947, but one female was found in the saddle between Mount Rogers and White Top Mountain on July 15, 1947, by Dr. L. R. Cleveland.

Remarks.—This attractive species is fairly common on Mount Rogers below the evergreen forest line, and was frequently seen out during the day, crawling on logs and across the trails. One evening four specimens were taken as they wandered about atop an old sawdust pile. A pair was seen in copulation on the night of July 1.

Deltotaria coronata is, apparently, the only xystodesmid milliped in eastern United States with the conspicuous and brilliant yellow band across the front of the collum. The specific name is given in recognition of the marking.

Genus NANNARIA Chamberlin

Nannaria CHAMBERLIN, Psyche, vol. 25, p. 124, 1918. (Genotype: *Nannaria minor* Chamberlin.)

Small, narrow-bodied forms characterized in part by the repugnatorial pores being lateral in position and by the uniform dorsal pattern of olive to black with the keels pink. The gonopods consist of a nearly straight slender lateral process and a smaller mesial process.

NANNARIA ERICACEA, new species

PLATE 27, FIGURES 9, 10

Diagnosis.—A large member of the genus characterized by the male gonopods, in which the telopodite is deeply bifurcated with the larger lateral process bearing a mesially directed terminal branch, and the smaller mesial process a simple flattened blade which reaches distad to the level of the branch of the lateral process.

Description.—Length of holotype, 30, width, 5 mm. Body width averages 16 percent of length. Segments between second and fifteenth of full width, body abruptly rounded in front, gently tapering behind.

Collum large, rounded in front, sides straight and with small marginal ridges; subtrapezoidal in dorsal aspect. Posterior margin indented across body, posterior corners angular. Collum not quite as long as two succeeding segments.

Second segment with keels shorter than tergite at midline, posterior edges of keels tapering cephalad, marginal ridges well developed. Segments 3 through 12 subsimiliar, anterior corners of keels rounded, posterior corners directed slightly caudad; all keels with prominent

marginal ridges; keels extending caudad of median posterior portion of tergites. Segments 14 to 19 with posterior lobes equal in length to tergites at midline. All tergites comparatively flat and smooth. Repugnatorial pores lateral in position, in some cases directed slightly downward.

Anal segment triangular in dorsal aspect, longer than broad, its basal width less than distance between keels of penultimate segment; truncate distally. Anal valves inflated, glabrous, with many small ridges and grooves on cephaloventral portion of each. Preanal scale roughly triangular with very large terminal lobe. Mesial ridges of anal valves unusually large.

Bases of last pair of legs very close. Legs of segments 8 to 18 similar, sternites of posterior pair of legs on the segments with conspicuous processes; coxae and trochanters unarmed, femoral spines large. Distal tarsal joint shorter than basal two, shorter than femur. Coxae of second pair of legs of male with cylindrical processes, rounded distally. Males with sternites between fourth legs with high conical knobs. Pregenital legs much more hirsute than postgenital limbs, and with heavy, blunt claws.

Gonopods at rest lie parallel and directed cephalad, reaching to the sternites of the fifth pair of legs, the terminal branches of the lateral processes crossed. Telopodite composed of two elements: a small bladelike mesial process which projects distad from the mesial side of the lateral process to the level of the terminal branch of the latter. Lateral process an almost straight cylindrical shaft with a terminal, distally directed tooth and a large subterminal branch which is bent mesiad and cephalad. Base of telopodite with the usual lateral setiferous shoulder and other structures as shown in the drawings.

In life, tergites blackish (occasionally dark olive-gray with a median dark line), the keels red on both corners as well as margin; extreme edges of keels colorless; underparts of body whitish gray. Head black on top, brown in front with edges of labrum a lighter brown; antennae light brown with distal portion of each article white.

Type specimens.—Male holotype in the U. S. National Museum, No. 1784. Several topoparatypes in my personal collection, RLH Nos. 4–2747–1, 5–1847–1c, and 6–147–1a.

Type locality.—McGraws Gap, 3 miles northwest of Clifton Forge, Alleghany County, Va. A deep watergap in sandstone ridges, with the forest composed chiefly of *Tsuga canadensis*, *Liriodendron tulipifera*, *Quercus alba*, *Q. prinus*, *Acer rubrum*, *A. pennsylvanicum*, *Rhododendron maximum*, and *Kalmia latifolia*. Herbaceous plants at the type locality include *Urtica dioica*, *Mitella diphylla*, *Mitchella repens*, and the ferns *Polypodium virginianum* and *Polystichum acrostichoides*.

Remarks.—Although not confined to ericaceous habitats, this species is certainly most abundant in such places, and is found elsewhere only rarely. Certain other members of this genus share the predilection for ericaceous thickets (e. g., *N. wilsoni*, see below).

Judged from the nature of the gonopods, *Nannaria ericacea* finds its closest relatives in *N. scutellaria* Causey and *N. tennesseensis* (Bollman).

In addition to the type locality, I have found this species at the following Virginia localities: *Craig County:* Barbours Creek, 9 miles northwest of Newcastle; *Botetourt County:* Craig Creek Valley, 2 miles northwest of Eagle Rock. The range is doubtless general over central western Virginia.

NANNARIA LAMINATA, new species

PLATE 27, FIGURES 11, 12

Diagnosis.—A medium-sized member of the genus, characterized by the structure of the male gonopods, in which the telopodite consists of two subequal processes, the lateral process being slender, spiniform, and with the distal portion curved mesially over the end of the broad, flat mesial process.

Description.—Length of holotype, 27, width, 5 mm. Width of body about 18 percent of length. Segments between second and fifteenth of full width, body abruptly rounded in front, gently tapering behind.

Collum large, subtrapezoidal in dorsal aspect, sides straight and with conspicuous marginal ridges, front slightly rounded. Posterior margin interrupted (emarginate across body); posterior corners angular. Collum as long as succeeding two segments combined.

Second segment with keels shorter than tergite at midline, posterior edges of keels tapering cephalad, keels with well-developed marginal ridges. Segments 3 through 12 subsimilar, anterior corners of keels rounded, posterior corners directed slightly caudad; all keels with prominent marginal ridges; keels extending caudad of median posterior portion of tergites. Segments 14 to 19 with posterior lobes shorter than tergite at midline. All tergites comparatively flat and very smooth. Repugnatorial pores lateral in position, in some instances directed slightly downward.

Anal segment triangular in dorsal aspect, as long as broad, its basal width greater than distance between keels of the nineteenth segment, truncate distally, the tip somewhat excavated. Anal valves inflated, glabrous, with ridges and grooves on the cephaloventral portion of each. Preanal scale semicircular, with tubercules almost obsolete.

Bases of last pair of legs narrowly separated. Legs of segments 8 to 18 subsimilar; sternites of posterior pair of legs of each with robust spines, coxae and trochanters unarmed, femoral spines large; distal

tarsal joint longer than proximal two, and as long as femur. Coxae of second pair of legs of male with cylindrical, distally truncate processes. Sternites of fourth male legs with conical knobs. Pregenital legs more hirsute than posterior.

Gonopods *in situ* lie parallel and directed cephalad between the bases of the seventh pair of legs, the tips of the lateral processes crossed. Telopodite composed of two elements, a smaller bladelike mesial process, which, when seen in cephalic view, projects distad from mesial side of base of telopodite, the tip slightly acuminate and twisted, reaching almost to end of lateral process. Latter a spiniform mesially directed shaft, tapering distally from a cylindrical basal portion, on the base of which is the usual cephalolateral setiferous shoulder.

In life, tergites blackish; most of keels reddish pink. Underparts of body whitish gray. Head brown with a wide light margin along the edge of the labrum; antennae olive-gray with the basal and terminal articles white.

Type specimen.—Male holotype in the U. S. National Museum, No. 1806, collected by Hobbs and Wilson on July 12, 1947.

Type locality.—A deep, shady, steep-sided ravine beside U. S. Route 460, about 2 miles south of Glen Lyn, Va., in Mercer County, W. Va. Forest cover of deciduous trees such as maple.

Remarks.—This species is related to *N. simplex*, differing chiefly in the bladelike mesial process of the gonopod, and in having the front of the head with a wide light margin.

NANNARIA SIMPLEX, new species

PLATE 27, FIGURES 13, 14

Diagnosis.—A medium-sized member of the genus characterized by the structure of the male gonopods, in which the telopodite blade is deeply divided, the lateral process being longer and curved mesiad over the end of the short spiniform mesial process. Head entirely black.

Description.—Length of holotype, 27.7, width, 4.8 mm. Body width averages 17 percent of length. Segments between second and fifteenth of full width, body abruptly rounded in front, gently tapering behind.

Collum large, subtrapezoidal in dorsal aspect, sides straight with a very small marginal ridge, front slightly concave. Posterior margin emarginate across body; posterior corners angular. Collum as long as succeeding two segments combined.

Second segment with keels shorter than tergite at midline, posterior edges of keels tapering cephalad, lateral edges with well developed marginal ridges. Segments 3 through 15 subsimilar, anterior corners of keels rounded, posterior corners directed slightly caudad;

all keels with prominant marginal ridges; keels extending caudad of median posterior portion of tergites. Segments 14 to 19 with keels becoming increasingly produced caudally, those of 19 with posterior lobes equal in length to tergite at midline. All tergites comparatively flat, and very smooth (except 18 and 19, which have tiny tubercules). Repugnatorial pores lateral in position, in some instances directed slightly downward.

Anal segment triangular in dorsal aspect, as long as broad, its basal width greater than distance between keels of segment 19, truncate distally. Anal valves inflated, glabrous, with ridges and grooves on cephaloventral portion of each. Preanal scale semicircular, with tubercules almost obsolete.

Bases of last pair of legs widely separated. Legs of segments 8 to 18 similar; sternites of posterior pair of legs with conspicuous spines, coxae and trochanters unarmed, femoral spines large. Distal tarsal joint longer than basal two, and as long as femur. Coxae of second legs of male with cylindrical, distally truncate processes. Sternites between fourth pair of legs of males with low rounded knobs. Pregenital legs much more hirsute than postgenital limbs.

Gonopods *in situ* lie parallel and directed cephalad between the bases of the seventh pair of legs, with distal ends in contact or crossed. Telopodite composed of two elements: a small spiniform mesial process which projects distad from the inner base of the telopodite, reaching almost as far distad as end of the lateral process. Latter a larger, mesially directed spine, tapering gently distally. Basal portion subcylindrical, with the usual lateral setiferous shoulder.

In life, tergites blackish, this color extending onto the keels in a blunt wedge, there replaced on both corners as well as lateral margin by reddish pink. Extreme edges of keels colorless. Underparts of body whitish gray. Head almost completely black. Antennae brown, first article white.

Type specimen.—Male holotype in the U. S. National Museum, No. 1807, collected by me on June 19, 1947.

Type locality.—McGraws Gap, 3 miles northwest of Clifton Forge, Alleghany County, Va. The locality is described under *Nannaria ericacea* (*q. v.*).

Remarks.—The occurrence of two species of *Nannaria* in the same ecological niche at the same locality is of some interest. As might be expected, this species differs from its congener (*ericacea*) in several respects other than the fundamental one of the male gonopods. The following differences will separate females as well as males:

N. ericacea: Head brown, edged with tan along labrum, bases of last pair of legs almost in contact, preanal scale broadly triangular.

N. simplex: Head black to margin of labrum, bases of last pair of legs widely separated, preanal scale more acute.

Nannaria simplex appears to be quite scarce. Despite many frequent searches at the type locality (which have produced many specimens of *ericacea*) only the holotype has been found. It was discovered under a small bit of hemlock bark, and when uncovered ran off with some show of celerity.

NANNARIA WILSONI, new species

PLATE 27, FIGURES 15, 16

Diagnosis.—A medium-sized member of the genus, characterized by the male gonopods, which are deeply bifurcated with the lateral process larger, the distal portion becoming flattened and twisted on its axis. Mesial process smaller, a simple spiniform branch.

Description.—Length of holotype, 25, width, 5 mm. Body width averages 20 percent of length. Segments between second and fifteenth of full width, body abruptly rounded in front, gently tapering behind.

Collum large, subtrapezoidal in dorsal aspect, sides straight and with very small marginal ridges; front slightly convex. Posterior edge emarginate across body; posterior corners angular. Collum as long as succeeding two segments combined.

Keels of segments anterior to fourteenth shorter than tergites at midline; posterior edges of keels tapering cephalad; lateral edges with well-developed marginal ridges. Segments 3 through 13 subsimilar, anterior corners almost square, posterior corners directed slightly caudad. Segments 14 through 19 with keels becoming increasingly produced caudally, those of 19 with posterior lobes large and bluntly rounded. All tergites comparatively flat, and very smooth. Repugnatorial pores lateral in position, in some instances directed slightly downward.

Anal segments triangular in dorsal aspect, as long as broad, its basal width less than distance between keels of penultimate segment, truncate distally. Anal valves inflated, glabrous, with small ridges and grooves on the cephaloventral portion, mesial ridges very large. Preanal scale triangular, more pointed than in *simplex*.

Bases of last pair of legs relatively close. Legs of segments 8 to 18 subsimilar; sternites of posterior pair of legs of each segment with conspicuous spines; coxae and trochanters unarmed, femoral spines large. Distal tarsal joint longer than basal two, and as long as femur. Coxae of second pair of legs of males with cylindrical, distally truncate processes. Sternites of fourth pair of legs of males with conical processes which are ovoid in cross-section. Pregenital legs much more hirsute than postgenital limbs, and terminating with heavy blunt claws.

Gonopods *in situ* lie parallel and directed cephalad between the bases of the sixth pair of legs. Tips may be in contact or crossed. Telopodite composed of two elements: a smaller spiniform mesial process which projects from the inner side of the lateral process and reaches distad almost to the end of the latter. Lateral process a cylindrical, almost straight shaft, the distal third of which is bent cephalad and is flattened and twisted on its axis.

In life, tergites blackish, keels reddish pink on both corners as well as margin, extreme edges of keels colorless. Underparts of body whitish gray. Head yellowish gray, only the top black. Antennae olive-gray, first and last articles white.

Type specimens.—Holotype and male paratype in the U. S. National Museum, No. 1808. Six additional topoparatypes in my personal collection. This material was secured by Hobbs, Walton, and Wilson in June and July 1947.

Type locality.—Mountain Lake, Giles County, Va. The region is described under *Apheloria picta* (*q. v.*) Most specimens taken in the vicinity of the University of Virginia Biological Station.

Remarks.—In addition to the type locality, *Nannaria wilsoni* is known from the following locality: Virginia, *Floyd County:* Rocky Knob Recreation Area, Blue Ridge Parkway, 6 miles southeast of Floyd. Several males and females (RLH No. 7–347–1b) were obtained by Hubert Kleinpeter and me on July 3, 1947. They were found in leaf mold and under small stones in a dense thicket of rhododendron and mountain laurel at an elevation of about 3,000 feet.

The gonopods of *wilsoni* are not similar to those of any presently known member of the genus.

Genus SIGMORIA Chamberlin

Sigmoria Chamberlin, Bull. Univ. Utah, vol. 30, No. 2, p. 7, 1939. (Genotype: *Sigmoria munda* Chamberlin.)

Telopodite of male gonopod an upright sigmoidally curved blade. Base of telopodite with a lateral spur or spine. The species are usually large with wide keels.

SIGMORIA FURCIFERA, new species

Plate 27, Figures 17, 18

Diagnosis.—A medium-sized species, distinguished by the structure of the male gonopod, the basal spine of which is bifurcated, and the telopodite blade bearing a small tooth on the mesial margin, which is produced into a large rounded lobe.

Description.—Length of holotype, 40, width, 10.5 mm. Body width averages 23 percent of length. Segments 4 through 16 of full